7

DGPS BROADCAST SITE SIGNAL COVERAGE FOR ALASKA AND HAWAII

Chapter 5 presented the requirements for DGPS broadcast sites necessary to provide the DGPS correction signal to all surface users in the continental U.S. This chapter presents the requirements for DGPS broadcast sites necessary to provide the DGPS correction signal to surface users in Alaska and Hawaii. The basis of the DGPS service in these two states is the network of DGPS broadcast sites now in operation by the U.S. Coast Guard (USCG), providing DGPS correction signal coverage to coastal areas and harbors. A medium frequency radio propagation model was utilized along with the operating parameters of each DGPS broadcast site, to predict the signal coverage of the individual broadcast sites in these areas. The signal coverage of the individual sites were then combined to determine the predicted signal coverage that would be obtained with the DGPS broadcast sites that are in operation. This radio propagation model was then used to determine the signal coverage that would be provided by Ground Wave Emergency Network (GWEN) type radio transmitter sites that were added to complete the signal coverage.

In order to provide the most cost effective solution to the implementation of DGPS service in Alaska and Hawaii, maximum use was made of existing DGPS broadcast sites. The signal coverage obtained is presented below in four stages:

1. Existing USCG DGPS signal coverage for Alaska
2. DGPS signal coverage for Alaska obtained by adding two GWEN sites
3. Existing USCG DGPS signal coverage for Hawaii

7.1 USCG DGPS Signal Coverage for Alaska

The basis of the Alaska DGPS service is the network of DGPS broadcast sites now in operation by the USCG, providing DGPS correction signal coverage to coastal areas, and harbors. The network was originally designed to provide signal coverage for harbor and harbor approach areas, and other critical waterways for which the USCG provides aids to navigation. The radiobeacon signal coverage provided by this network is shown in Figure 7.1. The locations and operating parameters of the DGPS broadcast sites making up this network is described in Table 7.1.

7.2 Additional DGPS Broadcast Sites Required for Signal Coverage in Alaska

The DGPS correction signal coverage provided by adding two GWEN type radio transmitter sites to the existing USCG DGPS broadcast sites is shown in Figure 7.2. The two added sites provide DGPS signal coverage along the major railroad line from Anchorage to Fairbanks. The locations and operating parameters of these broadcast sites are described in Table 7.2. The area of redundant signal coverage for Alaska, provided by this network, is shown in Figure 7.3.

7.3 USCG DGPS Signal Coverage for Hawaii

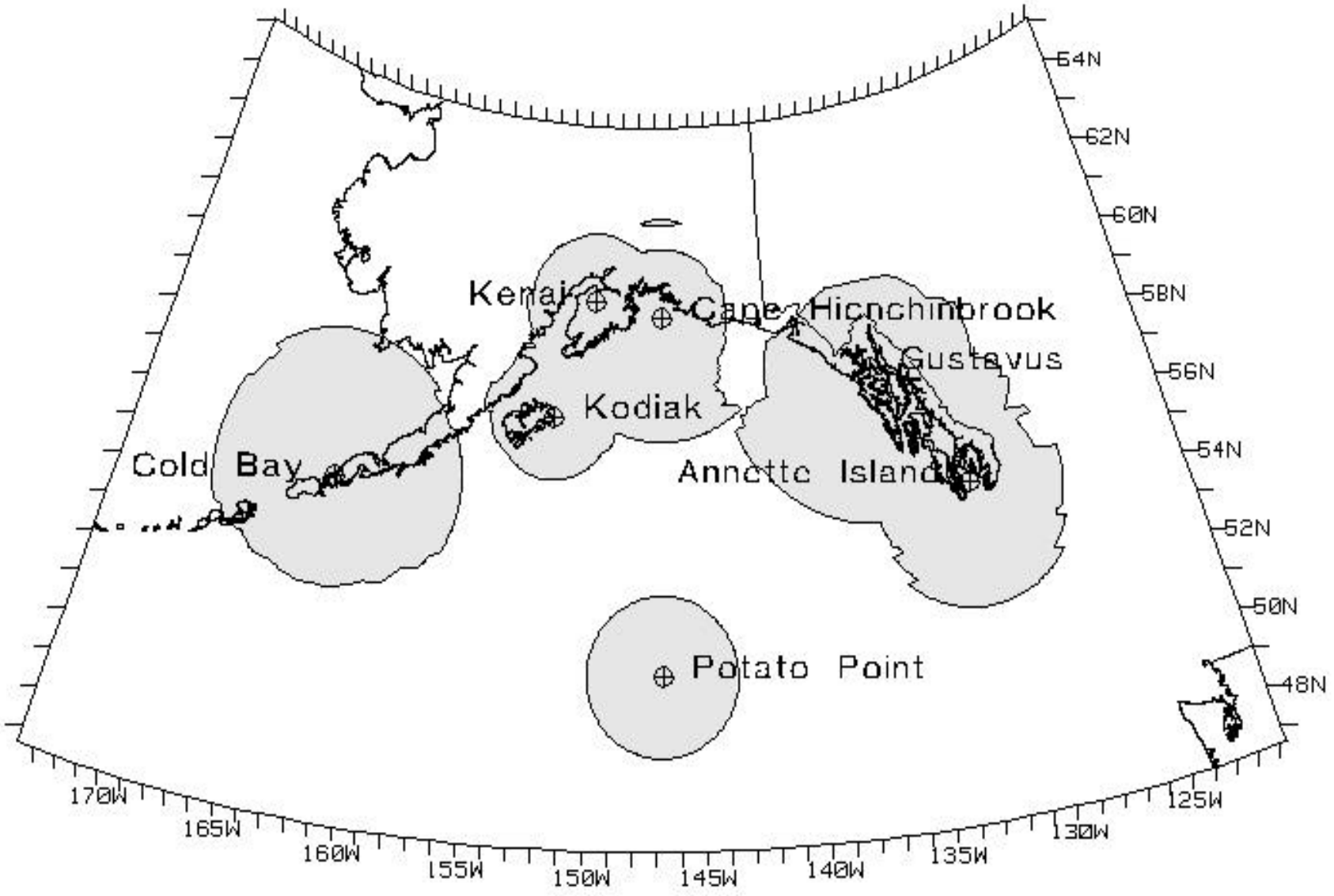

Figure 7.1. Predicted signal coverage for existing USCG DGPS broadcast sites in Alaska.

Table 7.1 USCG Alaska DGPS broadcast site information.

Broadcast Site	Frequency	Power	Latitude	Longitude
	kHz	W (ERP)	(N)	(W)
Cape Hinchinbrook, AK	292	27	60 14 18	146 38 48
Annette Island, AK	323	64	55 04 11	131 35 52
Cold Bay, AK	289	64	55 15 25	162 46 05
Gustavus, AK	288	64	58 25 20	135 42 10
Kenai, AK	310	64	60 35 50	150 13 01
Kodiak, AK	313	64	57 37 08	152 11 21
Potato Point, AK	298	8	51 03 24	146 41 48

Table 7.2 GWEN radio transmitter sites added for Alaska.

Broadcast Site	Frequency	Power	Latitude	Longitude
	kHz	W (ERP)	(N)	(W)
Gold Creek, AK	320	300	62 75 00	149 67 00
Anderson, AK	316	300	64 33 00	149 25 00

The basis of the Hawaii DGPS service is the network of DGPS broadcast sites now in operation by the USCG, providing DGPS correction signal coverage to coastal areas, and harbors. The network was originally designed to provide signal coverage for harbor and harbor approach areas, and other critical waterways for which the USCG provides aids to navigation. The radiobeacon signal coverage provided by this network is shown in Figure 7.4. The locations and operating parameters of the DGPS broadcast sites making up this network is described in Table 7.3.

7.4 Frequency Assignments

Existing USCG DGPS broadcast sites have an operating frequency assigned in the 285 to 325 kHz band. These assignments are noted in Tables 7.1 and 7.3. The operating frequencies recommended for new DGPS broadcast sites have been selected to avoid interference with other DGPS broadcast sites, and with Federal Aviation Administration beacons and FCC beacons that operate in this frequency band. The recommended new frequencies are noted in Table 7.2.

Table 7.3 USCG Hawaii DGPS broadcast site information.

Broadcast Site	Frequency	Power	Latitude	Longitude
	kHz	W (ERP)	(N)	(W)
Kokole Point, HI	300	230	22 03 30	159 46 34
Upolu Point, HI	285	20	20 14 48	155 53 12

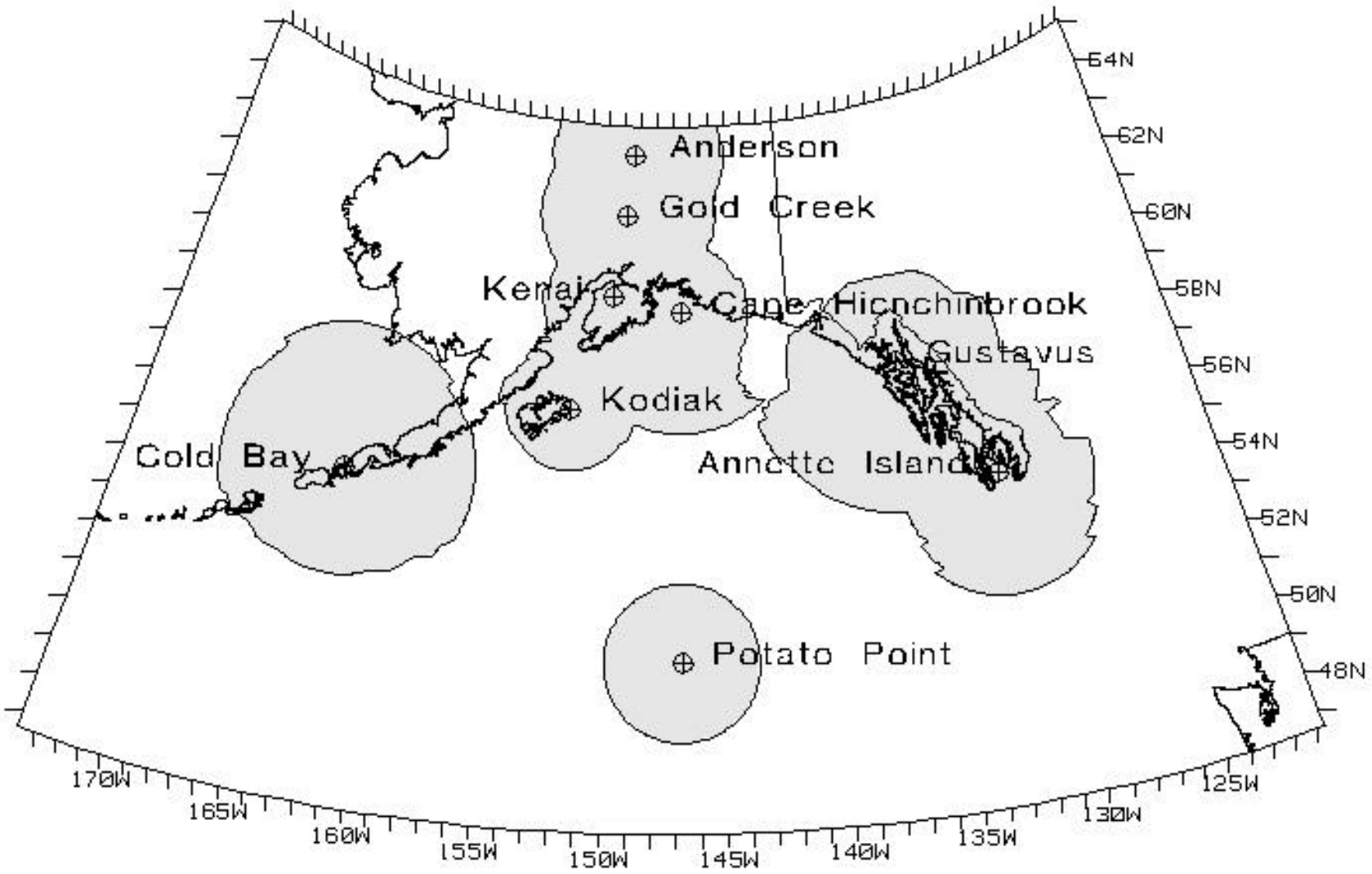

Figure 7.2. Predicted signal coverage for Alaska with 2 GWEN radio transmitter sites added to the USCG DGPS broadcast sites.

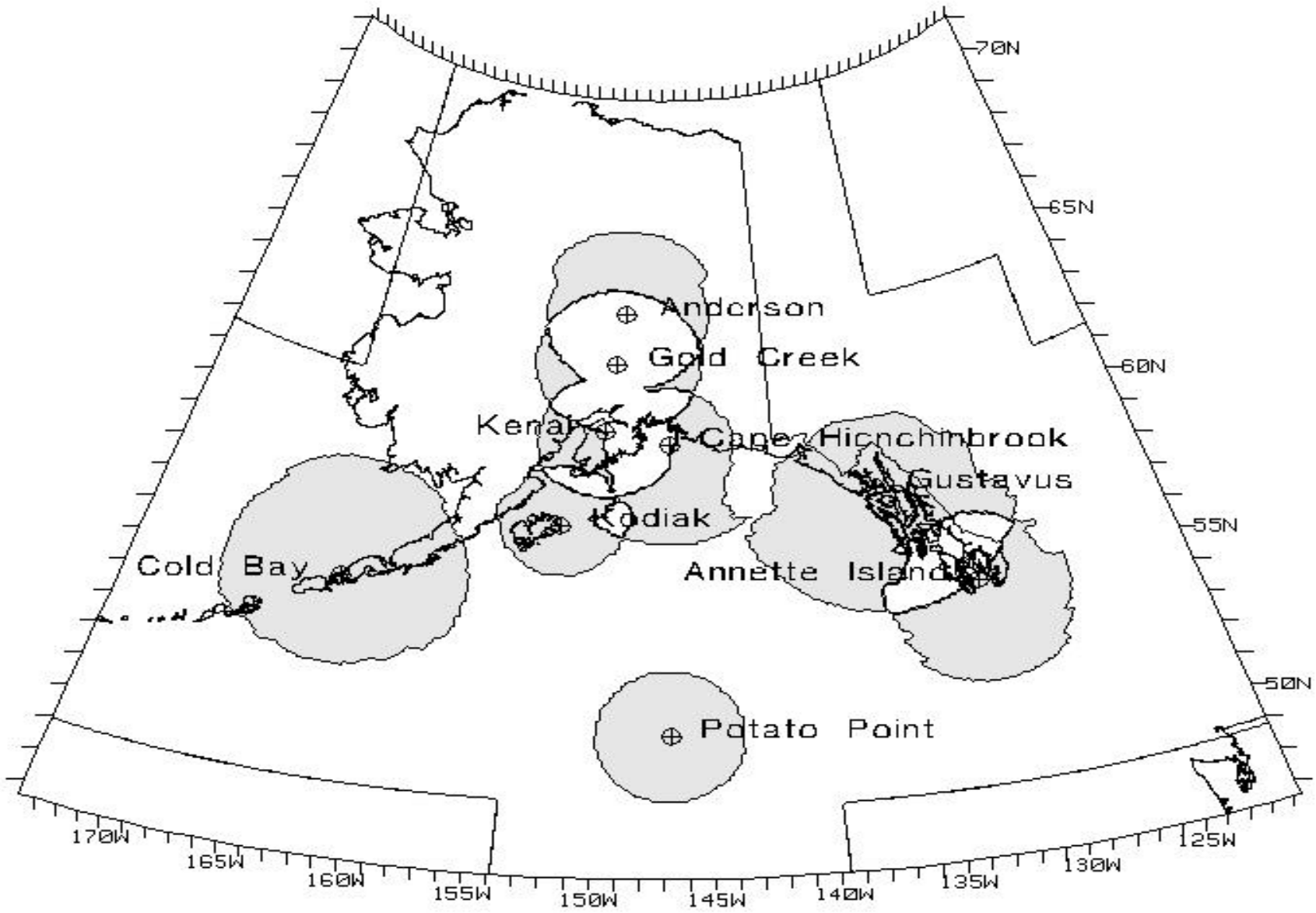

Figure 7.3. Predicted redundant signal coverage for Alaska.

7.5 Individual DGPS Broadcast Site Signal Coverage

The Figures 7.5 and 7.6 show the predicted signal coverage for individual DGPS broadcast sites that will be required to complete the signal coverage for Alaska DGPS service.

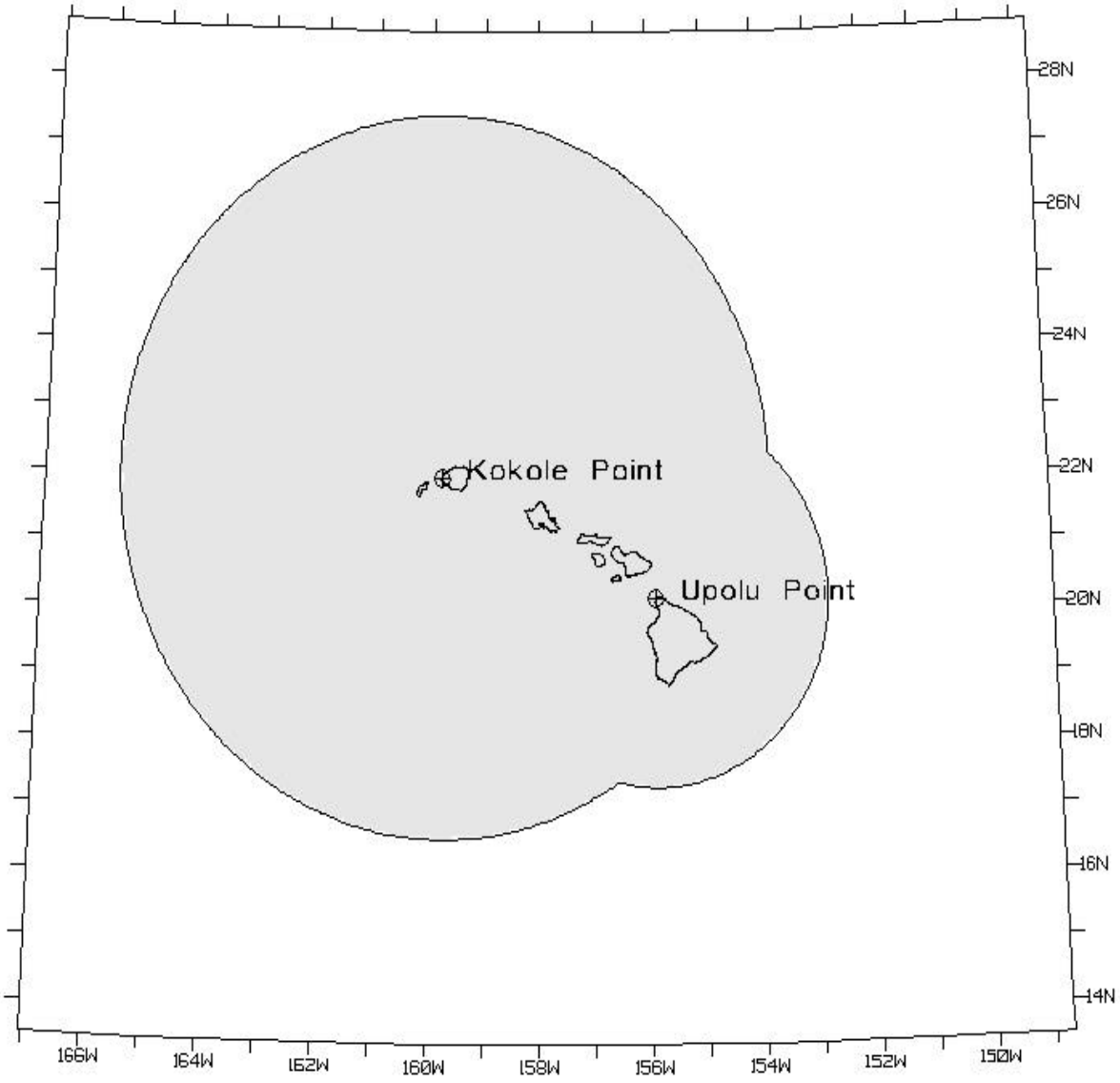

Figure 7.4. Predicted signal coverage for existing USCG DGPS broadcast sites in Hawaii.

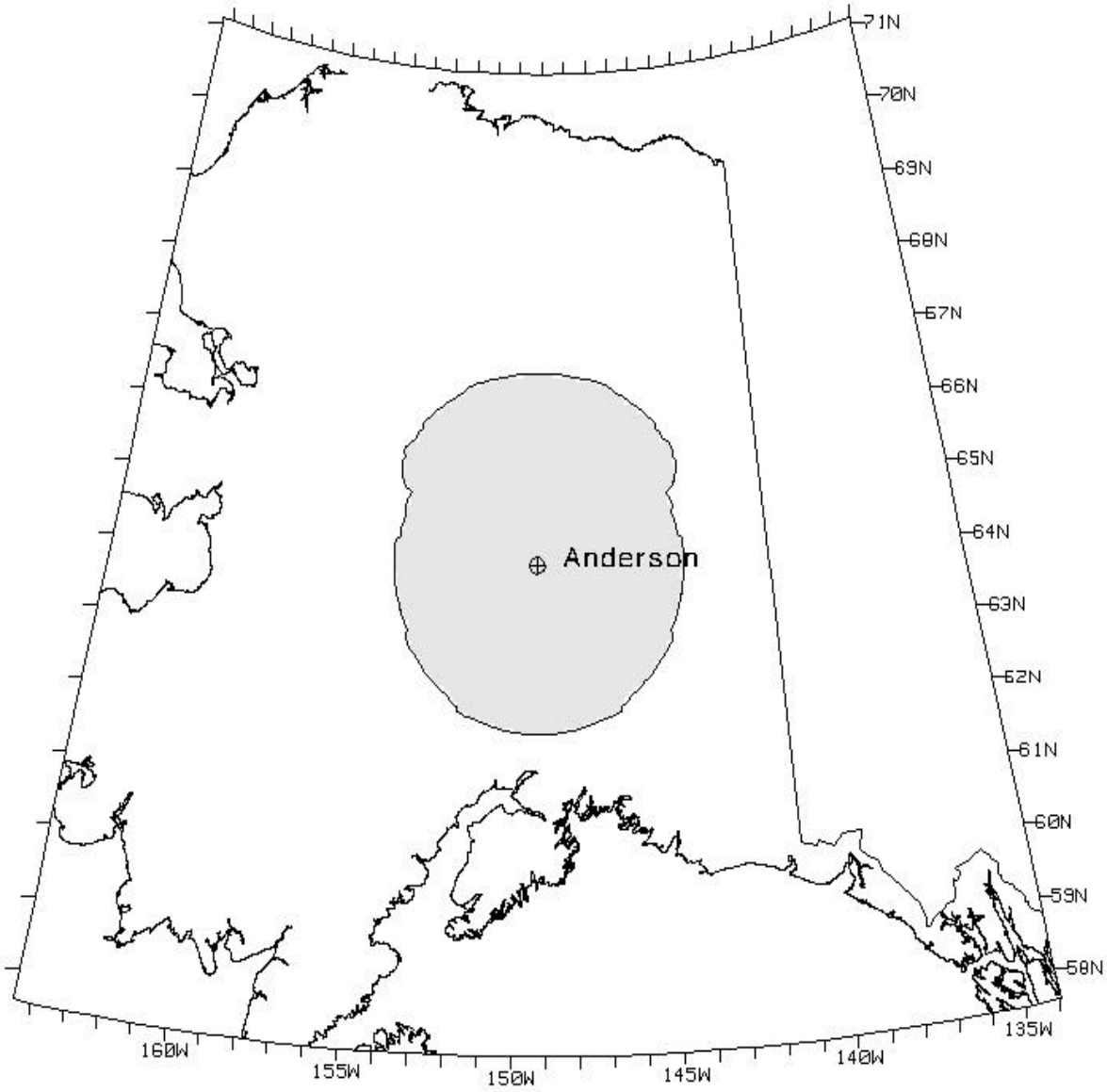

Figure 7.5. Anderson, AK.

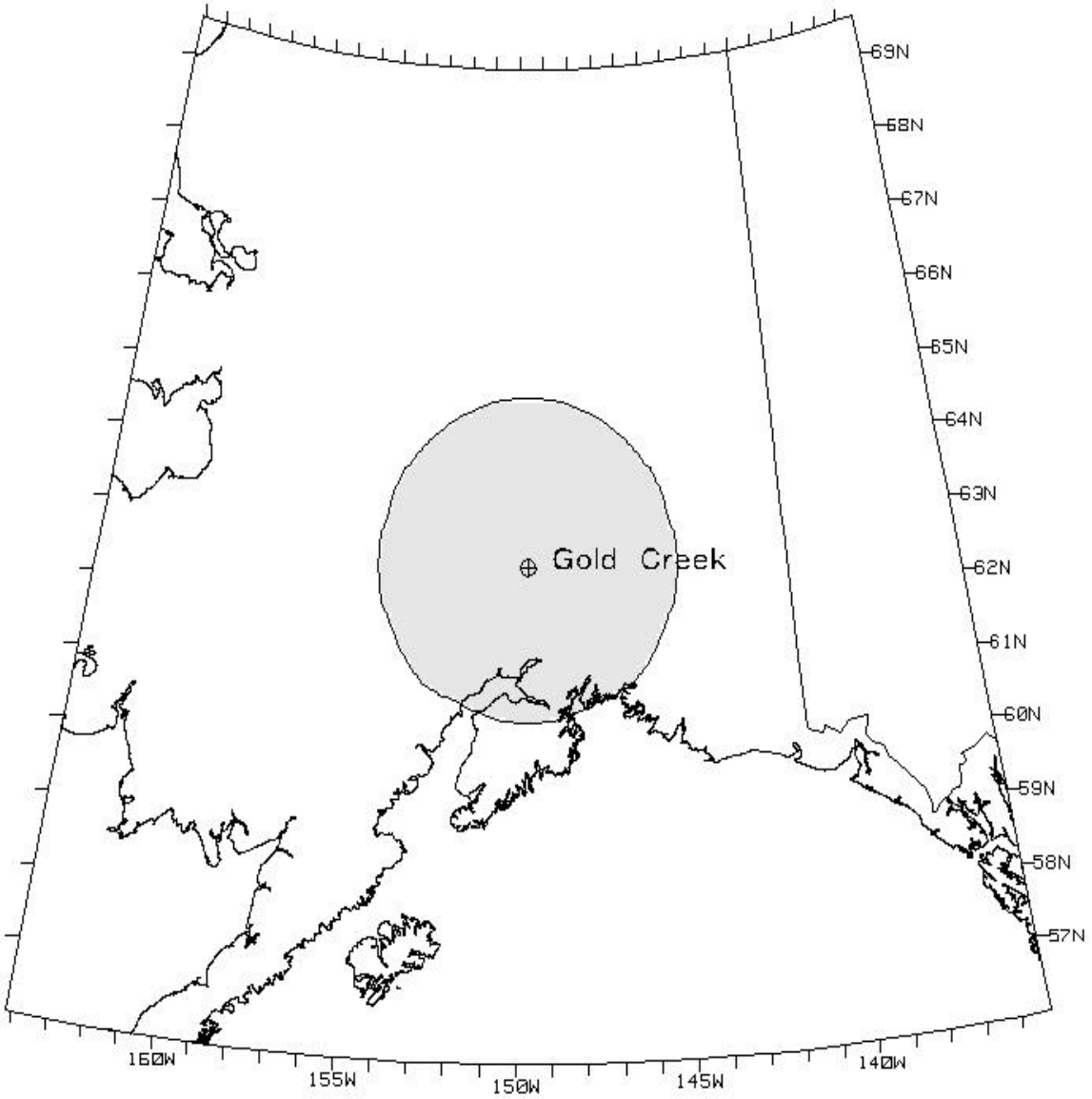

Figure 7.6. Gold Creek, AK.

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